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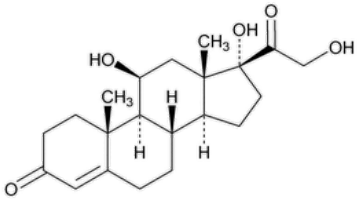
Hydrocortisone



$C_{21}H_{30}O_5$ 362.46

Pregn-4-ene-3,20-dione, 11,17,21-trihydroxy-, (11β)-;

Cortisol CAS RN®: 50-23-7; UNII: WI4X0X7BPJ.

DEFINITION

Hydrocortisone contains NLT 97.0% and NMT 102.0% of $C_{21}H_{30}O_5$, calculated on the dried basis.

IDENTIFICATION

Change to read:

• **A.** ▲**Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: 197M**▲ (CN 1-May-2020)

Change to read:

• **B.** ▲**Spectroscopic Identification Tests ⟨197⟩, *Ultraviolet-Visible Spectroscopy*: 197U**▲ (CN 1-May-2020)

Analytical wavelength: 242 nm

Sample solution: 10 µg/mL in methanol

Acceptance criteria: Absorptivities, calculated on the dried basis, do not differ by more than 2.5%.

ASSAY

• **Procedure**

Mobile phase: Acetonitrile, methanol, and water (25:25:50)

Diluent: Methanol and water (1:1)

Internal standard solution: 1 mg/mL of propylparaben in methanol

Standard stock solution: 1 mg/mL of USP Hydrocortisone RS in methanol

Standard solution: 2.0 mL of *Standard stock solution* and 2.0 mL of *Internal standard solution*. Dilute with *Diluent* to 50 mL.

Sample stock solution: 1 mg/mL of Hydrocortisone in methanol

Sample solution: 2.0 mL of *Sample stock solution* and 2.0 mL of *Internal standard solution*. Dilute with *Diluent* to 50 mL.

Chromatographic system

(See *Chromatography ⟨621⟩, System Suitability*.)

Mode: LC

Detector: UV 254 nm

Column: 4.6-mm × 15-cm; 5-µm packing L1

Flow rate: 1 mL/min

Injection size: 10 µL

System suitability

Sample: *Standard solution*

[Note—The relative retention times for hydrocortisone and propylparaben are about 1.0 and 1.8, respectively.]

Suitability requirements

Resolution: NLT 9.0 between the hydrocortisone and propylparaben peaks

Column efficiency: NLT 3000 theoretical plates for hydrocortisone

Tailing factor: NMT 1.2

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of hydrocortisone ($C_{21}H_{30}O_5$) in the portion of Hydrocortisone taken:

$$\text{Result} = (R_U/R_S) \times (C_S/C_U) \times 100$$

R_U = peak response ratio of hydrocortisone to the internal standard from the *Sample solution*

R_S = peak response ratio of hydrocortisone to the internal standard from the *Standard solution*

C_S = concentration of USP Hydrocortisone RS in the *Standard solution* (mg/mL)

C_U = concentration of Hydrocortisone in the *Sample solution* (mg/mL)

Acceptance criteria: 97.0%–102.0% on the dried basis

IMPURITIES

- **Residue on Ignition ⟨281⟩**

Sample: 100 mg

Acceptance criteria: NMT 0.5%

- **Organic Impurities**

Mobile phase: Butyl chloride, tetrahydrofuran, methanol, glacial acetic acid, and water (890:56:28:24:0.4)

Diluent: Butyl chloride, tetrahydrofuran, methanol, and glacial acetic acid (81.5:10:8:0.5)

Standard solution: 40 µg/mL of USP Hydrocortisone RS in *Diluent*. [Note—Sonicate for 5 min.]

Sample solution: 2 mg/mL of Hydrocortisone in *Diluent*. [Note—Sonicate for 5 min.]

Chromatographic system

(See *Chromatography ⟨621⟩, System Suitability*.)

Mode: LC

Detector: UV 254 nm

Column: 4.6-mm × 15-cm; 3-µm packing L3

Flow rate: 1.5 mL/min

Injection size: 5 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.0

Relative standard deviation: NMT 5%

Analysis

Samples: *Standard solution*, *Sample solution*, and *Diluent*. [Note—Ignore artifact peaks.]

Calculate the percentage of impurities in the portion of Hydrocortisone taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = individual impurity peak area from the *Sample solution*

r_S = peak area from the *Standard solution*

C_S = concentration of USP Hydrocortisone RS in the *Standard solution* (mg/mL)

C_U = concentration of Hydrocortisone in the *Sample solution* (mg/mL)

Acceptance criteria

Individual impurities: NMT 0.5%

Total impurities: NMT 2.0%

SPECIFIC TESTS

- **Optical Rotation, *Specific Rotation*⟨781S⟩**

Sample solution: 10 mg/mL, in dioxane

Acceptance criteria: +150° to +156°

• **Loss on Drying ⟨731⟩:** Dry a sample at 105° for 3 h: it loses NMT 1.0% of its weight.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in well-closed containers. Store at controlled room temperature.

• **USP Reference Standards ⟨11⟩**

USP Hydrocortisone RS

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
HYDROCORTISONE	Documentary Standards Support	SM52020 Small Molecules 5

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
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